

BU9-98-110DIV
09/666,325

REMARKS

Claims 21-26 and 28-34 are all the claims pending in the application. Claims 21 and 29 stand objected to because of informalities. Claims 21-24 and 28-32 stand rejected on prior art grounds. Claims 25-26, and 33-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all the limitations of the base claim. Therefore, claims 25 and 33 have been rewritten in independent form to place claims 25-26 and 33-34 in condition for allowance. Applicants respectfully traverse the rejections based on the following discussion.

I. The Objections to the Claims

Claims 21 and 29 stand objected to because of the use of "uppermost layer" not having proper antecedent basis. In view of this objection, claims 21 and 29 have been amended to replace the objected language with "top level of metallurgy" in order to overcome this objection and provide proper antecedent basis. Applicants further note that the same changes have been incorporated into rewritten independent claims 25 and 33.

It is Applicants intention that these claim amendments do not narrow the claims, but instead define the same features using slightly different wording. Therefore, Applicants submit that the foregoing claim amendments do not narrow the claims and do not create prosecution history estoppel, but instead merely amend the language to correct an inadvertent word-processing error. In view the forgoing, the Examiner is respectfully requested to reconsider and withdraw this objection.

BU9-98-110DIV
09/666,325

II. The Prior Art Rejections

Claims 21-22 and 27-30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Filipiak et al., hereinafter "Filipiak" (U.S. Patent No. 5,447,887); and claims 23-24, and 31-32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Filipiak in view Ngo et al., hereinafter "Ngo" (U.S. Patent No. 6,303,505). Applicants respectfully traverse these rejections based on the following discussion.

A. The Rejection Based on Filipiak

Applicants respectfully traverse this rejection because, while the Office Action proposes that there is an overlap at the 10% range, Applicants note that the claimed invention provides that the claimed silicide thickness is above 10% and Filipiak requires that the silicide thickness be less than 10%, and therefore there is no overlap of the ranges. More specifically, independent claims 21 and 29 define "an upper percentage above 10% to 20% of said bonding pad comprises a silicided surface," while Filipiak limits "the thickness of the silicide layer to less than 10% of the total copper thickness" (column 5, lines 66-68). Therefore, since the claims define that the percentage is above 10% and Filipiak requires that the thickness be less than 10% there is no overlap between the ranges discussed in the prior art and the claimed ranges. More importantly, by requiring that the thickness be less than 10%, the prior art teaches away from the claimed invention and would not motivate one ordinarily skilled in the art to arrive at the claimed structure.

The disclosure in Filipiak is consistent with the description of the problems associated with the prior art (see page 2, lines 5-15 of the application). More specifically, the prior art teaches that the thickness of a silicide layer should not exceed 10% of the total thickness of the metal layer. Filipiak is consistent with this teaching where it states that the thickness of the silicide layer 32 should be less than 10% of the total thickness of the copper interconnects as shown in Figure 5 (column 5, line 62-66). Filipiak explicitly explains that the reason for limiting

BU9-98-110DIV
09/666,325

the thickness of the silicide layer to less than 10% of the total copper thickness is that the silicidation degrades the resistivity of the copper interconnect (column 5, line 66-column 6, line 1). Filipiak states that where resistivity is not an important issue silicide thickness may not be as tightly controlled.

In the claimed invention, the thickness of the uppermost layer reduces sensitivity to resistivity shifts associated with the silicided surface. Therefore, in the claimed invention, resistivity is an important issue in that reducing sensitivity to resistivity shifts is a claimed feature. With respect to the claimed invention (e.g., where resistivity is an important issue), the teachings in Filipiak require that the silicide layer not be greater than 10% of the total thickness of the interconnect.

Contrary to the teachings in Filipiak, independent claims 21 and 29 define that the silicide surface is within the top percentage above 10% to 20% of the conductive layer. Note that page 5, line 7-9 of the application states that the invention solves the conventional problems by increasing the thickness of the silicide layer above 10%. Therefore, since the claims define that resistivity is an important issue and that the silicide surface is outside the range required by Filipiak, the prior art cannot be said to teach or suggest the invention.

Further, one ordinarily skilled in the art would not have experimented outside the 10% range in order to arrive at Applicants' invention. Applicants note that Filipiak teaches one ordinarily skilled in the art not use a silicide thickness greater than 10%. Therefore, using the teachings in Filipiak, one ordinarily skilled in the art would not use a silicide layer of having a thickness above 10% where resistivity shifts are important (as in the claimed invention). The claimed invention breaks away from conventional teachings and includes a silicide layer in the range above 10% and up to 20%. Filipiak teaches away from the claimed invention by teaching that the silicide layer should be less than 10% in situations where resistivity is important. Therefore, any arguments that Applicants merely discovered an optimum working range involving only routine skill are inappropriate considering that the prior art (Filipiak) teaches one ordinarily skilled in the art not to use ranges above 10% when resistivity issues are important.

BU9-98-110DIV
09/666,325

Therefore, with respect to claims 21 and 29, that define "an upper percentage above 10% to 20% of said bonding pad comprises a silicided surface," Applicants submit that such features are clearly not taught or suggested by Filipiak. Indeed, Filipiak teaches away from such claimed features. Thus, as shown above, Filipiak teaches away from the invention defined by independent claims 21 and 29 and the invention defined by independent claims 21 and 29 is patentable over Filipiak. Further, dependent claims 23-24, 28, and 30-32 are similarly patentable over Filipiak, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. In view the forgoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

B. The Rejection Based on Filipiak in view of Ngo

The Office Action argues that Ngo discloses cleaning the top level of metallurgy. However, Ngo is silent regarding the percentage that the copper silicide represents of the overall copper interconnect 13A. There is nothing in Ngo that would lead one ordinarily skilled in the art to break away from the well-known teaching that silicide layers should comprise less than 10% of the copper silicide metallurgy in order to avoid resistivity problems (see the applied Filipiak reference, discussed above, and page 2, lines 5-15 of the application). This clear teaching explains the conventional necessity to restrict the silicide to less than 10% of the overall thickness of the metallurgy.

In view of the forgoing, Applicants submit that Ngo does not teach "an upper percentage above 10% to 20% of said bonding pad comprises a silicided surface," as defined by independent claim 21 and similarly defined by independent claim 29. Therefore, Applicants respectfully submit that independent claims 21 and 29 are patentable over Filipiak even if combined with Ngo. Further, dependent claims 22-24, and 30-32 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. In view of the forgoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

BU9-98-110DIV
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III. Formal Matters and Conclusion

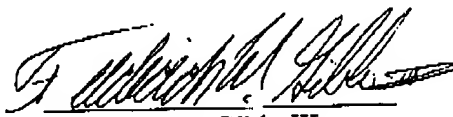
In view of the foregoing, Applicants submit that claims 21-26 and 28-34, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Please charge any deficiencies in fees and credit any overpayments to Attorney's Deposit Account Number 09-0456.

Respectfully submitted,

Dated: 10/16/03


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